EFFECTS OF THE CURVES™ FITNESS & WEIGHT LOSS PROGRAM I: BODY COMPOSITION

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Abstract

160 sedentary women (38.7±8 yr; 93.2±19 kg; 44.8±4.8 % body fat) participated in a 14-wk exercise and diet program. Subjects were randomly assigned to a control group (C), an exercise and no diet group (ND+E); an exercise and high calorie diet (2,600 kcals/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E); or, a low calorie high carbohydrate (HCHO+E), high protein (HP+E), or very high protein (VHP+E) diet. The diets involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks. Diets contained 30% fat with carbohydrate intake ranging from 40-55% on the HCD+E and HCHO+E diets and protein intake ranging from 50-63% on the HP+E and VHP+E diets. After the diet phase, subjects ingested 2,600 kcal/d and 1,200 kcal/d diets at 3/2, 3/2, 5/2, & 10/2 day intervals in an attempt to maintain weight loss. Subjects participated in a supervised Curves fitness program 3-d per wk (30-min of circuit resistance training interspersed with callisthenic exercises). DEXA body composition measurements were obtained at 0, 10, and 14 weeks. Data were analyzed by repeated measures ANOVA and are presented as means ± SD changes from baseline for the C, ND+E, HCD+E, HCHO+E, HP+E and VHP+E groups, respectively. After 10 weeks, subjects who dieted experienced a greater loss in scanned body mass (-0.2±3.2; -0.8±1.9; -1.2±3.1; -3.7±3.0; -4.1±3.7; -5.2±4.1 kg) and fat mass (0.1±2.6; -0.8±1.6; -0.5±2.0; -2.6±2.1, -2.8±2.7, -3.7±3.1 kg). Intermittent dieting maintained losses in scanned mass (0.6±3.5; -0.7±2.2 -1.1±3.3; -3.6±3.8; -4.0±4.0; -5.4±4.8 kg) and fat mass (0.4±2.7; -0.9±1.8; -0.9±3.0; -2.9±2.8; -2.9±3.2, -4.1±3.7 kg). Results indicate that the Curves program is effective to promote and maintain weight loss particularly when following a VHP diet.
Supported in part by Curves International, Inc. (Waco, TX).

Rationale

The Curves fitness and weight loss program has become a very popular means of promoting health and fitness among women. The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and fitness. Although the program has been based on sound rationale, the effects of following this program have not been studied. The purpose of this study is to examine the acute and chronic effects of Curves International fitness and diet program on body composition changes in sedentary overweight females.

Experimental Design

Subjects

- 160 sedentary women (38.5±9 yr; 94.0±19 kg; 43.8±4.3 % body fat) participated in a 14-wk exercise and diet program.
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subjects' guidelines of Baylor University.

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to one of the following groups:
  - an exercise and no diet group (ND+E);
  - an exercise and high calorie mixed diet (2,600 kcals/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E);
  - an exercise and low calorie high carbohydrate (HCHO+E);
  - an exercise and low calorie high protein (HP+E); or,
  - an exercise and low calorie very high protein (VHP+E) diet.
- The last three low calorie diets involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal/d diets at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and improve body composition.
- Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E and HCHO+E diets and protein intake ranging from 50-63% on the HP+E and VHP+E diets.

Training

- Subjects participated in a supervised 30-min resistance training circuit program that was interspersed with calisthenic exercises 3-d per week for 14 weeks.

Methods & Procedures

- DEXA body composition measurements were obtained at 0, 10 & 14 weeks.
- DEXA scans were completed using a Hologic QDR-4500W using software version 4.0.
- Interpretations of total scanned body mass, fat mass, lean mass, and percent body fat were obtained from these measures.

Statistical Analysis

- Data were analyzed by repeated measures ANOVA analysis using SPSS for Windows version 11.5 software *(Chicago, IL)* and are presented as means ± SD from baseline for the C, ND+E, HCD+E, HCHO+E, HP+E and VHP+E groups, respectively.

Results

- After 10-weeks, subjects involved in dieting experienced a significantly greater loss in:
  - body weight (0.8±2.6; -0.4±2.1; -1.1±3.1; -4±3.1; -4±3.8; -5.7±4.3 kg);
  - scanned mass (-0.2±3.2; -0.8±1.9; -1.2±3.1; -3.7±3.0; -4.1±3.7; -5.2±4.1 kg);
  - fat mass (0.1±2.6; -0.8±1.6; -0.5±2.0; -2.6±2.1, -2.8±2.7, -3.7±3.1 kg), and,
  - percent body fat (0.2±1.7; -0.6±1.4; -0.0±1.6; -1.5±1.7, -1.4±1.7, -1.6±2.0%)
- Intermittent dieting maintained scanned mass (0.6±3.5; -0.7±2.2 -1.1±3.3; -3.6±3.8; -4.0±4.0; -5.4±4.8 kg) and fat mass (0.4±2.7; -0.9±1.8; -0.9±3.0; -2.9±2.8; -2.9±3.2, -4.1±3.7 kg) indicating this approach appears to help maintain weight loss.
- The majority of the weight loss was fat (76-100%) with the percentage of FFM significantly increased in dieting groups (i.e., inversely rated to decrease on percent body fat).

Conclusions

- The Curves fitness and weight loss program increases weight loss in all groups, especially those following a diet plan.
- Intermittent dieting following weight loss appears to be an effective way to maintain and/or further promote weight loss and improvements in body composition.

Funding
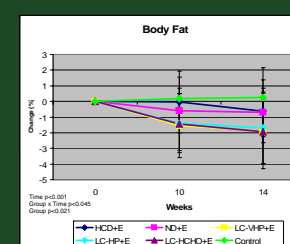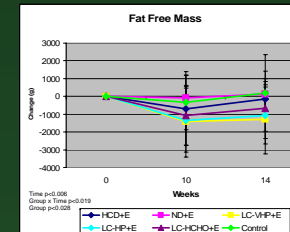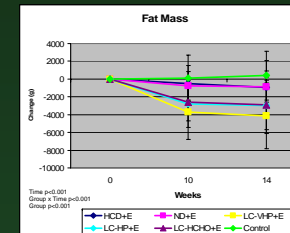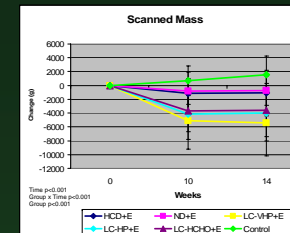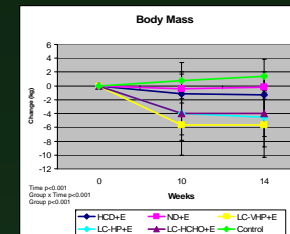
EFFECTS OF THE CURVES™ FITNESS AND WEIGHT LOSS PROGRAM II: RESTING ENERGY EXPENDITURE

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Abstract

Dieting typically decreases resting energy expenditure (REE) contributing to weight regain after weight loss. 160 sedentary women were assigned to a control group (C), an exercise & no diet group (E+ND); an exercise & high calorie diet (HCD) group (2,600 kcals/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F); or, a low calorie high carbohydrate (HCHO), high protein (HP), or very high protein (VHP) diet. Diets involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks as described above. Subjects ingested 2,600 kcal/d and 1,200 kcal/d diets at 3/2, 3/2, 5/2, & 10/2 day intervals during a maintenance phase. Subjects participated in a supervised Curves fitness program 3-d per wk. Fasting REE measurements were obtained at 0, 2, 10, and 14 weeks. Data were analyzed by repeated measures ANOVA and are presented as means ±SD changes from baseline for the C, E+ND, HCD, HCHO, HP and VHP groups, respectively. After 2 wks, REE generally decreased in all groups except the HCD group (-1.4±2.4; -0.6±2.5; 2.6±2.0; -0.7±2.0; 0.3±3.0; -1.1±2.4 kcal/d/kg; mean 0.4±2.6). After 10 wks, REE increased by 1.2±2.7 kcal/d/kg (0.1±3.1; 1.0±1.2; 4.1±2.3; 1.5±2.6; 1.4±3.0; 0.4±2.3 kcal/d/kg) with the greatest gain observed in the HCD group. REE further increased during the maintenance phase (-0.1±1.1; 1.1±2.1; 4.8±3.1; 2.0±2.6; 2.1±5.5; 0.9±2.3 kcal/d/kg; mean 1.7±3.5). Results indicate that the increases in REE observed appears to play a role in promoting and/or maintaining weight loss in women participating in this exercise and diet program.

Supported in part by Curves International, Inc., Waco, TX

Rationale

The Curves International fitness and weight loss program has become a very popular means of promoting health and fitness among women. The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and muscle mass. Additionally, the program claims to promote increases in resting metabolic rate through alterations in diet and caloric intake thereby helping promote and maintain weight loss. Although the program has been based on sound scientific rationale, the effects of women following this program have not been studied in detail. The purpose of this study is to examine the acute and chronic effects of Curves International fitness and diet program on weight loss and resting energy expenditure in sedentary overweight females.

Experimental Design

Subjects

- 160 sedentary women (38.7±8 yr; 93.2±19 kg; 44.8±4.8 % body fat) participated in a 14-wk exercise and diet program.
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subject guidelines of Baylor University.

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to:
  - an exercise and no diet group (E+ND);
  - an exercise and high calorie mixed diet (2,600 kcal/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E);
  - a low calorie high carbohydrate group (HCHO+E);
  - a low calorie high protein (HP+E); or,
  - a low calorie very high protein (VHP+E) diet.
- The diets involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal diet at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and REE.
- Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E and HCHO+E diets and protein intake ranging from 50-63% on the HP+E and VHP+E.

Training Protocol

- Subjects participated in a supervised 30-min hydraulic resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week.

Methods & Procedures

- Body weight, DEXA body composition, and REE measurements were obtained at 0, 2, 10, 10.4 & 14 weeks.
- REE was measured via Parvo Medics TrueOne® 2400 Metabolic Measurement System Version 4.1 following standard procedures.

Statistical Analysis

- Data were analyzed by repeated measures ANOVA using SPSS for Windows version 11.5 software and are presented as means ±SD changes from baseline for the C, E+ND, HCD+E, HCHO+E, HP+E and VHP+E groups, respectively.

Results

- Significant interactions (p<0.001) were observed among groups in absolute and relative REE.
- After 2 wks, REE generally decreased in all groups except the HCD+E group (-1.4±2.4; -0.6±2.5; 2.6±2.0; -0.7±2.0; 0.3±3.0; -1.1±2.4 kcal/d/kg; mean 0.4±2.6).
- After 10 wks, REE increased by 1.2±2.7 kcal/d/kg (0.1±3.1; 1.0±1.2; 4.1±2.3; 1.5±2.6; 1.4±3.0; 0.4±2.3 kcal/d/kg) with the greatest gain observed in the HCD+E group.
- REE further increased during the maintenance phase (-0.1±1.1; 1.1±2.1; 4.8±3.1; 2.0±2.6; 2.1±5.5; 0.9±2.3 kcal/d/kg; mean 1.7±3.5).

Conclusions

- Results indicate that the increases in REE observed appears to play a role in promoting and/or maintaining weight loss in women participating in the Curves exercise and diet program.
- These findings indicate that this program appears to be an effective and appropriate level exercise program for this population.

Funding

Resting Energy Expenditure

Resting Energy Expenditure

Body Mass

Fat Mass

Lean Mass
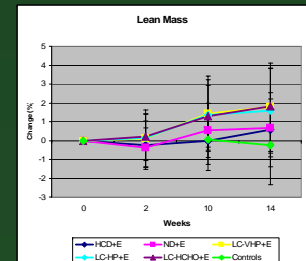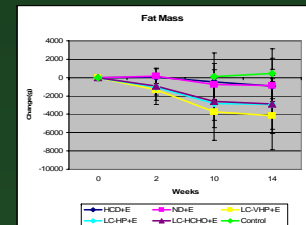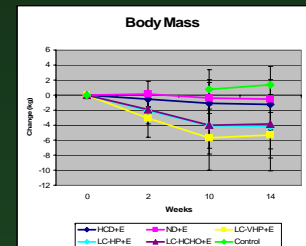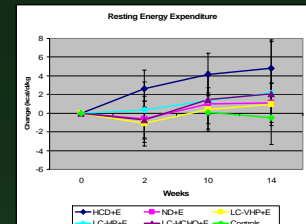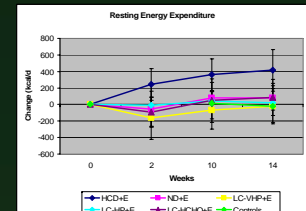
EFFECTS OF THE CURVES™ FITNESS & WEIGHT LOSS PROGRAM III: TRAINING ADAPTATIONS

C. Rasmussen, C. Kerksick, T. Magrans, B. Campbell, J. Baer, A. Thomas, B. Slonaker, M. Grimstvedt, E. Pfau, J. Opusunju, C. Wilborn, B. Marcello, L. Taylor, C. Mulligan, D. Rohle, A. Vacanti, S. Ounpraseuth, P. Casey, R. Wilson, M. Greenwood, C. Earnest & R. Kreider

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Abstract

160 sedentary women participated in a 14-wk exercise and diet program. Subjects were randomly assigned to a control group, an exercise and no diet group, an exercise and high calorie diet group; or, one of three low calorie diets that involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks as described below. After the diet phase, subjects ingested 2,600 kcal/d and 1,200 kcal/d diets at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss. Subjects participated in a supervised Curves fitness program (30-min of circuit resistance training interspersed with calisthenic exercises) 3 d/wk. Data were obtained at 0, 10, and 14 wks and were analyzed by repeated measures ANOVA. Data are presented as means ± SD percentage changes from baseline. Training significantly increased relative bench press 1RM (18.5 ±34%); leg press 1RM (19.1±25%); bench press lifting volume (33.7±85%); and leg press lifting volume (40.6±87%) compared to control group values of 5.0±14%, 9.4±20%, 10±34%, and 7.7±32%, respectively. No significant differences were observed among training groups. Training also significantly increased relative peak oxygen uptake (14.4±48%) with a significantly greater gain observed in VHP diet group (32.5±78%) compared to a control value of 1.9±17%. Resting HR (-3.3±17%, p=0.03), SBP (-2.8±10%, p=0.04), DBP (-3.6±12%, p<0.02), MAP (-3.4±10%, p<0.007), and RPP (-5.8±21%, p<0.005) decreased in response to training with no differences observed among diet groups. Results indicate that the Curves fitness program improves muscular strength, muscular endurance, aerobic capacity, and resting cardiovascular hemodynamics. Therefore, this program appears to be effective in enhancing general markers of fitness and health in this population.

Supported in part by Curves International, Inc. (Waco, TX).

Rationale

The Curves fitness and weight loss program has become a very popular means of promoting health and fitness among women. The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and fitness. Although the program has been based on sound rationale, the effects of following this program have not been studied. The purpose of this study is to examine the acute and chronic effects of Curves International fitness and diet program on muscular strength, muscular endurance, aerobic capacity, and resting cardiovascular hemodynamic variables in sedentary overweight females.

Experimental Design

Subjects

- 160 sedentary women (38.5±9 yr; 94.0±19 kg; 43.8±4.3 % body fat) participated in a 14-wk exercise and diet program.
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subjects guidelines of Baylor University.

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to one of the following groups:
  - an exercise and no diet group (ND+E);
  - an exercise and high calorie mixed diet (2,600 kcals/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E);
  - a low calorie high carbohydrate group (LC-HCHO+E);
  - a high protein group (LC-HP+E); or,
  - a very high protein (LC-VHP+E) diet group.
- The diets involved consuming 1,200 kcal/d for 2-weeks and 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal diet at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and REE.
- Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E and LC-HCHO+E diets and protein intake ranging from 50-63% on the LC-HP+E and LC-VHP+E diets.

Training

- Subjects participated in a supervised 30-min resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week.

Methods & Procedures

- 1RM bench press, 1RM leg press, BP lifting volume, LP lifting volume, VO_{2max}, and resting hemodynamic variables were obtained at 0, 10, & 14 weeks using standard procedures.

Statistical Analysis

- Data were analyzed by repeated measures ANOVA analysis using SPSS for Windows version 11.5 software *(Chicago, IL)* and are presented as means ± SD from baseline for each diet group.
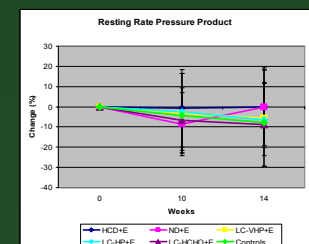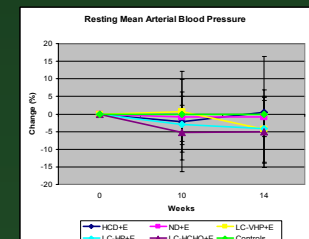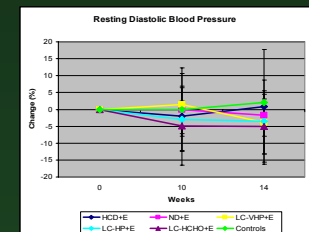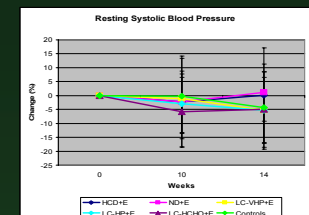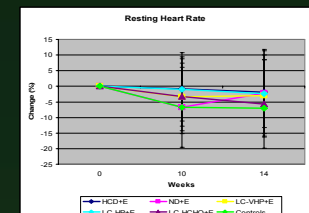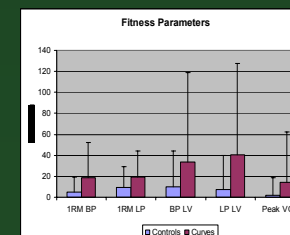
Results

- After 14 weeks, subjects experienced significant (p<0.001) increases in relative 1RM bench press (18.5±34%); 1RM leg press (19.1±25%), BP lifting volume (33.7±85%); and, LP lifting volume (40.6±87%) compared to control group values of 5.0±14%, 9.4±20%, 10±34%, and 7.7±32% respectively.
- No significant differences were observed among groups.
- Training also significantly increased relative peak oxygen uptake (14.4±48%, p<0.04) with a significantly greater gain (p<0.05) observed in the VHP diet group (32.5±78%) compared to a control value of 1.9±17%.
- Resting HR (-3.3±17%, p=0.03), SBP (-2.8±10%, p=0.04), DBP (-3.6±12%, p<0.02), MAP (-3.4±10%, p<0.007), and RPP (-5.8±21%, p<0.005) decreased in response to training with no differences observed among groups.

Conclusions

- The Curves fitness and weight loss program appears to increase muscular strength, muscular endurance, and aerobic capacity in this population of subjects.
- The Curves fitness and weight loss program appears to decreases resting cardiovascular hemodynamics in this population of subjects.

Funding

Fitness Parameters

Resting Heart Rate

Resting Systolic Blood Pressure

Resting Diastolic Blood Pressure

Resting Mean Arterial Blood Pressure

Resting Rate Pressure Product

EFFECTS OF THE CURVES™ FITNESS AND WEIGHT LOSS PROGRAM IV: HEALTH MARKERS

B. Slonaker, C. Rasmussen , C. Kerksick, T. Magrans, B. Campbell, J. Baer, A. Thomas, E. Pfau, M. Grimstvedt, J. Opusunju, C. Wilborn, B. Marcello, L. Taylor, C. Mulligan, D. Rohle, A. Vacanti, S. Ounpraseuth, P. Casey, R. Wilson, M. Greenwood, C. Earnest & R. Kreider

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Abstract

PURPOSE: The Curves fitness and diet program has become very popular among adult women with over 2 million women currently participating in the program. However, the efficacy of this program has yet to be examined. This study examined the effects of the Curves fitness and diet program on general markers of health. **METHODS:** 154 sedentary women (38.7±8 yr; 93.2±19 kg; 44.8±4.8 % body fat) participated in a 14-wk exercise and diet program. Based on baseline testing, subjects were randomly assigned to an exercise and no diet group (ND+E); an exercise and high calorie mixed diet (2,600 kcals/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E); or, a low calorie high carbohydrate (LC-HCHO+E), high protein (LC-HP+E), or very high protein (LC-VHP+E) diet. The diets involved consuming 1,200 kcals/d for 2-wks and 1,600 kcals/d for 8 wks. Subjects then ingested 2,600 kcals/d and 1,200 kcals/d diet at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and REE. Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E and LC-HCHO+E diets and protein intake ranging from 50-63% on the LC-HP+E and LC-VHP+E diets. Subjects participated in a supervised 30-min resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week. At 0, 2, 10, 10.4 and 14 weeks, subjects donated fasting blood samples and had waist and hip measurements determined. Subjects were also questioned about side effects on a weekly basis. Hematological variables were measured to assess the blood lipid profiles. Data were analyzed by repeated measures ANOVA and are presented as means ± SD from baseline at week 2, 10, 10.4, and 14 of the study, respectively. **RESULTS:** Total cholesterol (-8.5±12; -4.5±12; -5.0±12; -1.6±13%), LDL-c (-7.4±19; -2.4±21; -4.3±21; -1.1±21%) significantly decreased during the study with no significant differences observed among groups. Subjects also experienced a significant decrease in waist (-2.5±7; -3.6±9; -5.7±8, -6.2±7 cm), hip (-1.4±7; -3.9±8; -3.3±8, -3.6±7 cm), and the ratio of waist to hip measurements (-0.01±0.10; -0.001±0.13; -0.03±0.09, -0.03±0.08) which served to decrease the overall ratio for this age group from 0.84±0.09 (Very High Risk) to 0.81±0.05 (High Risk). Although some hematological variables decreased over time, there were no clinically significant interactions observed in remaining hematological markers or in weekly follow-up reports. **CONCLUSIONS:** The Curves fitness and weight loss program improves blood lipid profiles and decreases the waist to hip ratio without adversely affecting the general markers of clinical status.

Supported in part by Curves International, Inc., Waco, TX

Rationale

The Curves International fitness and weight loss program has become a very popular means of promoting health and fitness among women. The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and muscle mass/tone. Although the program has been based on sound scientific rationale, the effects of women following this program have not been studied in detail. The purpose of this study is to examine the acute and chronic effects of Curves International fitness and diet program on general markers of health in sedentary overweight females.

Experimental Design

Subjects

- 154 sedentary women (38.7±8 yr; 93.2±19 kg; 164.3±3 cm; 44.8±4.8 % body fat) participated in this study.
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subject guidelines of Baylor University.

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to:
  - an exercise and no diet group (ND+E);
  - an exercise and high calorie mixed diet (2,600 kcal/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E);
  - a low calorie high carbohydrate diet group (LC-HCHO+E);
  - a low calorie high protein diet group (LC-HP+E); or,
  - a low calorie very high protein (LC-VHP+E) diet group.
- The diets involved consuming 1,200 kcals/d for 2-wks and 1,600 kcals/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal diet at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and REE.
- Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E and LC-HCO+E diets and protein intake ranging from 50-63% on the LC-HP+E and LC-VHP+E.

Training Protocol

- Subjects participated in a supervised 30-min resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week.

Methods & Procedures

- At 0, 2, 10, 10.4 and 14 weeks, subjects donated fasting blood samples as well as had waist and hip measurements determined.
- Subjects reported any side effects associated with participating in the study to a research nurse on a weekly basis.
- Hematological variables were assayed by Quest Diagnostics, Inc. (Dallas, TX) for a comprehensive panel of biochemical markers and the ratio of waist to hip measurements was calculated to assess general markers of clinical health status.

Statistical Analysis

- Data was analyzed by repeated measures ANOVA using SPSS for Windows version 11.5 software (Chicago, IL) and are presented as means ± SD from baseline for each diet group at week 2, 10, 10.4, and 14 of the study, respectively.

Results

- Total cholesterol (-8.5±12; -4.5±12; -5.0±12; -1.6±13% mg/dl), LDL-c (-7.4±19; -2.4±21; -4.3±21; -1.1±21% mg/dl) significantly decreased during the study with no significant differences observed among groups.
- Subjects experienced a significant decrease in waist (-2.5±7; -3.6±9; -5.7±8, -6.2±7 cm), hip (-1.4±7; -3.9±8; -3.3±8, -3.6±7 cm), and the ratio of waist to hip measurements (-0.01±0.10; -0.001±0.13; -0.03±0.09, -0.03±0.08) which served to decrease the overall ratio for this age group from 0.84±0.09 (Very High Risk) to 0.81±0.05 (High Risk).
- Although some hematological variables decreased over time, there were no clinically significant interactions observed in remaining hematological markers or in weekly follow-up reports.
- No clinically significant side effects or adverse events were reported in weekly follow-up assessments.

Conclusions

- The Curves fitness and weight loss program promotes improvements in blood lipid profiles and decreases the waist to hip ratio.
- Participation in this program does not appear to adversely affect general markers of clinical health status.

Funding

Total Cholesterol

LDL Cholesterol

Waist Circumference

Hip Circumference

Waist / Hip Ratio
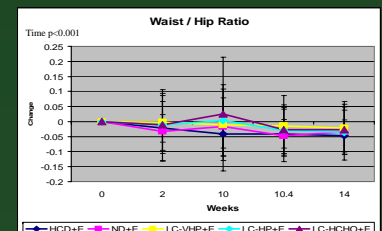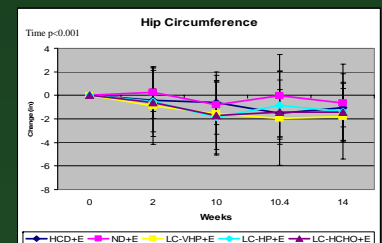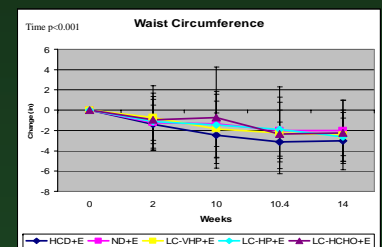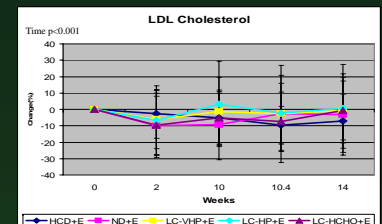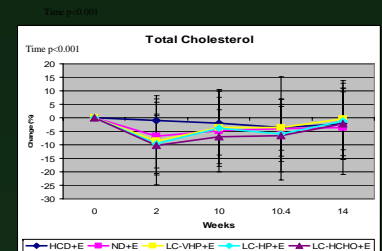
EFFECTS OF THE CURVES™ FITNESS & WEIGHT LOSS PROGRAM V: RELATIONSHIP OF LEPTIN TO WEIGHT LOSS

A Vacanti, L Taylor, C Mulligan, D Rohle, D Fogt, C Rasmussen, C Kerksick, T Magrans, B Campbell, J Baer, A Thomas, R Slonaker, M Grimstvedt, E Pfau, C Wilborn, B Marcello, S Ounpraseuth, P Casey, R Wilson, M Greenwood, C Earnest & R Kreider.

Exercise & Sport Nutrition Lab, Baylor University, P.O. Box 97313, Waco, TX 76798-7313

Abstract

This study examined whether weight loss induced by diet and/or exercise influences leptin. 153 sedentary women participated in the 14-wk Curves exercise and diet program described above while 7 subjects served as controls. Fasting blood samples were obtained 0, 2, 10, 10.4, and 14 wks for exercise and diet groups as well as at 0, 10, and 14 wks for controls. Data were analyzed by repeated measures ANOVA and Pearson correlation analysis. Data are presented as means ± SD changes from baseline for the C, ND+E, HCD+E, LC-HCHO+E, LC-HP+E and LC-VHP+E groups, respectively. After 2 wks of training and dieting, leptin levels significantly decreased (-27.3±32 %). These changes were maintained at 10 (-18.7±35 %), 10.4 (-20.4±30 %), and 14 wks (-16.8±29 %). No significant differences were observed among exercise and diet groups (p=0.16). However, when control group data were included in the analysis, a significant interaction was observed (p=0.001) with leptin levels in the ND+E, LC-HCHO+E, LC-HP+E, and LC-VHP+E lower than C values at 10 wks (17.4±31; -13.0±24; -3.6±22; -22.4±32; -27.9±31, -14.4±45 %) and 14 wks (29.4±35; -8.6±23; -10.8±22; -19.7±29; -24.7±25, -12.8±34 %). Leptin levels were significantly correlated with body mass, fat mass, and body fat at each data point with stronger relationships observed as the study progressed. Results indicate that the Curves fitness and diet program decreases leptin levels and that changes are correlated with weight loss.

Supported in part by Curves International, Inc., Waco, TX

Rationale

The Curves International fitness and weight loss program has become a very popular means of promoting health and fitness among women. The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and muscle mass/tone. Although the program has been based on sound scientific rationale, the effects of women following this program have not been studied in detail. The purpose of this study is to examine whether weight loss induced Curves International fitness and diet program influences leptin production in sedentary overweight females.

Experimental Design

Subjects

- 153 sedentary women (38.8±8 yr; 94.3±19 kg; 164.3±3 cm; 43.8±4.3 % body fat) participated in a 14-wk exercise and diet program.
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subject guidelines of Baylor University.

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to one of the following groups:
  - an exercise and no diet group (ND+E);
  - an exercise and high calorie mixed diet group(2,600 kcal/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E);
  - a low calorie high carbohydrate diet group (LC-HCHO+E);
  - a low calorie high protein diet group(LC-HP+E); or,
  - a low calorie very high protein diet group (LC-VHP+E).
- The diets involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal diet at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and REE.
- Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E and LC-HCHO+E diets and protein intake ranging from 50-63% on the LC-HP+E and LC-VHP+E.

Training Protocol

- Subjects participated in a supervised 30-min resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week.

Methods & Procedures

- At 0, 2, 10, 10.4, and 14-weeks, subjects donated fasting blood samples.
- Plasma samples were analyzed for leptin via Enzyme-Linked Immunosorbent Assay from Diagnostic Systems Laboratories, Inc. (Webster, TX) on a Wallac Victor[2] 1420 Multilabel Counter manufactured by PerkinElmer Life Sciences (Wellesley, MA).

Statistical Analysis

Data were analyzed by repeated measures ANOVA and Pearson correlation analysis using SPSS for Windows version 11.5 software (Chicago, IL) and are presented as means ± SD from baseline for each diet group.

Results

- After 2 wks of training and dieting, leptin levels significantly decreased (-27.3±32 %).
- No significant differences were observed among exercise and diet groups (p=0.16)
- When control group data were included in the analysis, a significant interaction was observed (p=0.001) with leptin levels in the ND+E, LC-HCHO+E, LC-HP+E, and LC-VHP+E lower than C values at 10 wks (17.4±31; -13.0±24; -3.6±22;-22.4±32; -27.9±31, -14.4±45 %) and 14 wks (29.4±35; -8.6±23; -10.8±22; -19.7±29; -24.7±25, -12.8±34 %).
- Leptin levels were significantly correlated (p<0.05) with body mass, fat mass, and body fat at each data point with stronger relationships observed as the study progressed
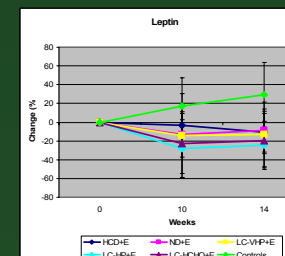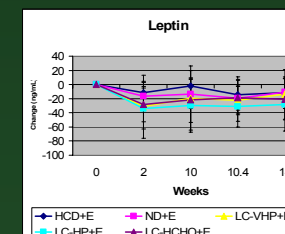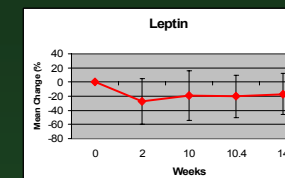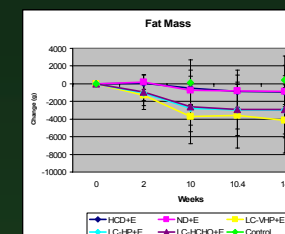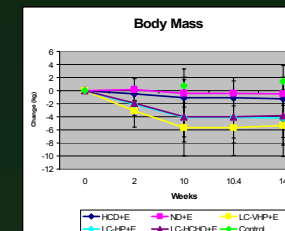
Conclusions

Results indicate that the Curves fitness and diet program decreases leptin levels and that changes are correlated with weight loss.

Funding

Body Mass

Fat Mass

Leptin

Leptin

Leptin

EFFECTS OF THE CURVES™ FITNESS & WEIGHT LOSS PROGRAM VI: INSULIN SENSITIVITY

C Mulligan, D Fogt, L Taylor, D Rohle, A Vacanti, C Rasmussen, C Kerksick, T Magrans, B Campbell, J Baer, A Thomas, R Slonaker, C Wilborn, B Marcello, E Pfau, M Grimstvedt, J Opusunju, S Ounpraseuth, P Casey, R Wilson, M Greenwood, C Earnest & R Kreider

Exercise & Sport Nutrition Lab, Baylor University, P.O. Box 97313, Waco, TX 76798-7313

Abstract

Insulin resistance has been suggested to play a role in obesity. This study examined whether weight loss induced by diet and/or exercise influences insulin sensitivity. 153 sedentary women participated in the Curves 14-wk exercise and diet program while 7 subjects served as controls. Fasting blood samples were obtained 0, 2, 10, 10.4, and 14 wks for exercise and diet groups as well as at 0, 10, and 14 wks for controls. Data were analyzed by repeated measures ANOVA and Pearson product correlation analysis. Data are presented as means ± SD changes from baseline for the C, ND+E, HCD+E+E, LC-HCHO+E, LC-HP+E and LC-VHP+E groups, respectively. Results revealed that exercise and diet significantly decreased fasting glucose levels with no significant differences observed among groups. No significant time or group x time interaction effects were observed among groups in fasting insulin, glucose/insulin ratio, or homeostatic glucose/insulin ratio. Insulin levels during the study were significantly correlated with changes in body mass, fat mass, and body fat. However, the glucose/insulin ratio and homeostatic glucose/insulin ratio were not significantly correlated to body composition changes. Results indicate that subjects participating the Curves fitness and weight loss program experience weight loss and reductions in blood glucose with no apparent effects on insulin sensitivity.

Supported in part by Curves International, Inc., Waco, TX

Rationale

The Curves International fitness and weight loss program has become a very popular means of promoting health and fitness among women. The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and muscle mass. Insulin resistance has been suggested to play a role in obesity. This study examined whether weight loss induced by the Curves diet and exercise program influences insulin sensitivity in sedentary overweight females.

Experimental Design

Subjects

- 153 sedentary women (38.8±8 yr; 94.3±19 kg; 164.3±3 cm; 43.8±4.3 % body fat) participated in a 14-wk exercise and diet program.
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subject guidelines of Baylor University.

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to:
  - an exercise and no diet group (ND+E);
  - an exercise and high calorie mixed diet (2,600 kcal/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E+E);
  - a low calorie high carbohydrate group (LC-HCHO+E);
  - a low calorie high protein (LC-HP+E); or,
  - a low calorie very high protein (LC-VHP+E) diet.
- The diets involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal diet at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and REE.
- Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E+E and LC-HCHO+E diets and protein intake ranging from 50-63% on the LC-HP+E and LC-VHP+E.

Training Protocol

- Subjects participated in a supervised 30-min resistance training circuit program that was interspersed with callisthenic exercises and performed 3-d per week.

Methods & Procedures

- At 0, 2, 10, 10.4, and 14-weeks, subjects donated fasting blood samples.
- Plasma samples were analyzed for insulin via Enzyme-Linked Immunosorbent Assay from Diagnostic Systems Laboratories, Inc. (Webster, TX) on a Wallac Victor^2 1420 Multilabel Counter manufactured by PerkinElmer Life Sciences (Wellesley, MA).
- Fasting glucose samples were analyzed by Quest Diagnostics, Inc. (Dallas, TX).
- Insulin sensitivity was calculated as the ratio of fasting glucose / insulin as well as calculating the homeostatic glucose insulin ratio (Fasting Insulin x Fasting Glucose / 405).

Statistical Analysis

Data were analyzed by repeated measures ANOVA and Pearson correlation analysis using SPSS for Windows version 11.5 software (Chicago, IL) and are presented as means ± SD from baseline for each group.

Results

- Exercise and diet significantly decreased fasting glucose levels with no significant differences observed among groups.
- No significant time or group x time interaction effects were observed among groups in fasting insulin, glucose/insulin ratio, or homeostatic glucose/insulin ratio.
- Insulin levels were significantly correlated with changes in body mass, fat mass, and body fat.
- The glucose/insulin ratio and homeostatic glucose/insulin ratio were not significantly correlated to body composition changes.
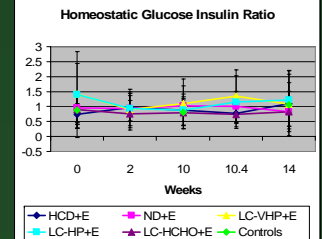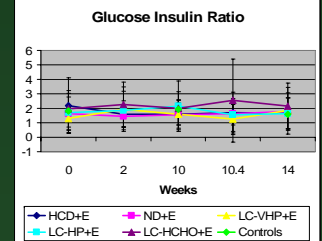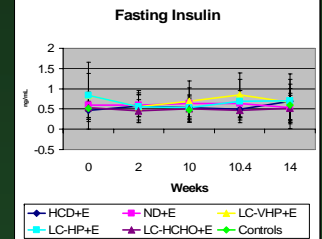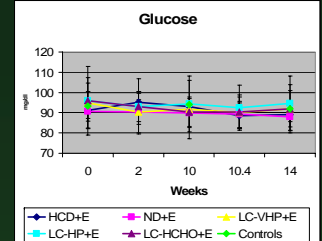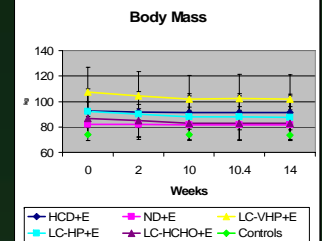
Conclusions

Subjects participating in the Curves fitness and weight loss program experience weight loss and reductions in blood glucose with no apparent effects on insulin sensitivity.

Funding

Body Mass

Glucose

Fasting Insulin

Glucose Insulin Ratio

Homeostatic Glucose Insulin Ratio

EFFECTS OF THE CURVES™ FITNESS AND WEIGHT LOSS PROGRAM VII: QUALITY OF LIFE

R Bowden, B Lanning, H Johnston, C Rasmussen, C Kerksick, T Magrans, B Campbell, J Baer, A Thomas, R Slonaker, E Pfau, M Grimstvedt, C Wilborn, B Marcello, D Fogt, L Taylor, C Mulligan, D Rohle, A Vacanti, S Ounpraseuth, P Casey, R Wilson, M Greenwood, C Earnest & R Kreider

Exercise & Sport Nutrition Lab, Baylor University, P.O. Box 97313, Waco, TX 76798-7313

Abstract

141 sedentary women participated in a 14-wk exercise and diet program. Participants were randomly assigned to an exercise and no diet group, an exercise and high calorie diet group, or one of three low calorie diets (HCHO, HP, and VHP) that involved consuming 1,200 kcal/d for 2 weeks and 1,600 kcal/d for 8 wks. Participants then ingested 2,600 kcal/d and 1,200 kcal/d diets at 3/2, 3/2, 5/2, & 10/2 day intervals in an attempt to maintain weight loss. Participants participated in a supervised Curves fitness program 3 d/wk that involved a circuit of resistance training and callisthenic exercises. The SF-36 Quality of Life (QOL) inventory was administered at 0, 10, and 14 wks. Data were analyzed by repeated measures ANOVA and Pearson product correlation analysis. Data are presented as means ± SD changes from baseline for 10 and 14 wks, respectively. Results revealed that physical functioning (6.7±22; 9.3±19), bodily pain (6.1±30; 4.9±25), general health (8.3±14; 8.4±15), vitality (11.2±15; 11.9±14), and mental health (6.3±13; 7.3±14) scores significantly increased. Role emotional scores (-13.2±43; -16.5±44) were significantly decreased while social functioning scores were unchanged. However, the changes observed were not significantly correlated with changes in body weight, body composition, strength, or aerobic fitness. These findings indicate that the Curves fitness and weight loss program can improve markers of QOL but that changes are not related to changes in body composition or fitness.

Supported in part by Curves International, Inc., Waco, TX

Introduction

Health-related quality of life (HRQOL) has recently been used as an outcome measure in clinical weight loss trials with some clinical studies using this measure as the primary outcome (Kolotkin and Crosby, 2002). The present study used the SF-36 as the HRQOL outcome measure. The SF-36 is a common measure of HRQOL that covers 40 concepts related to health and was developed and used in the Medical Outcomes Survey. The SF-36 is a generic instrument which measures HRQOL by assessing eight different dimensions: physical functioning (10 items), role limitations caused by physical health problems (4 items), bodily pain (2 items), general health perceptions (6 items), energy/fatigue (4 items), social function (2 items), role limitation caused by emotional problems (3 items), and emotional well-being (5 items). The items are scored, with the higher score representing better HRQOL. Validity and reliability has been demonstrated in weight loss studies.

Overweight is a serious public health issue in the United States which can lead to problems in physical functioning, psychosocial functioning and increases in healthcare expenditures. Little research has addressed the issue of weight loss and its corresponding impact on HRQOL. Additionally, HRQOL in overweight subjects is not as well documented as disease outcomes in these individuals (Hans et al., 1998).

Overweight has been associated with adverse affects on HRQOL in a recent study (Fontaine et al., 1999). Fontaine et al. (1999) found obese persons seeking university-based treatment for overweight reported significant decrements in all domains of HRQOL when compared to norms for the general population. Fontaine et al. reported in their study that weight loss in mild-to-moderately overweight persons may be associated with an improvement in HRQOL. The greatest benefits were reported in the vitality, general health perception and role-physical domain using the SF-36. Hans et al (1998) found HRQOL outcomes were related to both waist circumference and body mass index with women having more severe problems than men. Sullivan et al. (1993) also reported that psychological consequences of obesity and overweight are more serious in women. Fine et al. (1999) found weight loss to be associated with improved physical functioning and decreased bodily pain. Finally, Kushner and Foster (2000) discovered that dissatisfaction with quality of life is one of the major reasons individuals seek medical attention for obesity. The purpose of this study was to examine the acute and chronic effects of Curves International fitness and diet program on weight loss, body composition, metabolism, exercise capacity, and HRQOL in sedentary overweight females.

Experimental Design

Subjects

- 141 sedentary women participated in a 14-wk exercise and diet program
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subjects guidelines with Baylor University

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to:
  - An exercise and no diet group
  - An exercise and high calorie mixed diet (2,600 kcal/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40 % C, 30% P, 30% F; 4 wks at 55%C, 15% P, 30% F) group
  - A low calorie high carbohydrate group
  - A low calorie high protein group
  - A low calorie very high protein diet
- The diet involved consuming 1200 kcal/d for 2 wks and 1600 kcal/d for 8 wks. Subjects then ingested 2600 kcal/d and 1200 kcal/d at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and resting energy expenditure (REE)

Training Protocol

- Subjects participated in a supervised 30-min hydraulic resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week.

Brief Methods

Participants completed the SF-36 questionnaire at 0, 10, and 14 wks of the study

Statistical Analysis

Data was analyzed using group x time repeated measures analysis of variance (ANOVA) with SPSS for Windows Version 11 software (*SPSS Inc., Chicago, IL*).

Results

The following variables increased significantly

- Physical functioning (6.7±22; 9.3±19) scores
- Bodily pain (6.1±30; 4.9±25) scores
- General health (8.3±14; 8.4±15) scores
- Vitality (11.2±15; 11.9±14) scores
- Mental health (6.3±13; 7.3±14) scores
- Role emotional (-13.2±43; -16.5±44) scores decreased
- Social functioning scores were unchanged
- The changes observed were not significantly correlated with changes in body weight, body composition, strength, or aerobic fitness.

Conclusions

These findings indicate that the Curves fitness and weight loss program can improve markers of QOL but that changes are not related to changes in body composition or fitness. Exercise and dietary changes may be enough to improve the subjective quality of life of the participants. Though these findings support previous published work, it may in fact demonstrate improvements in HRQOL can occur due to behavior change rather than physiological change.

Funding

Quality of Life

Physical Functioning

Bodily Pain

General Health

Vitality

Social Functioning
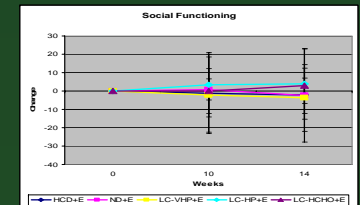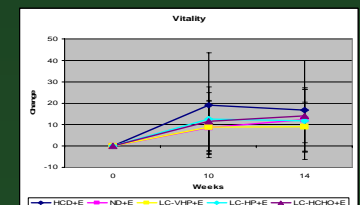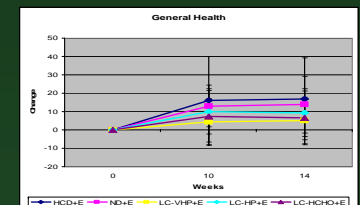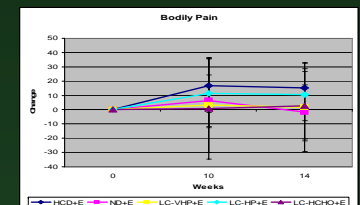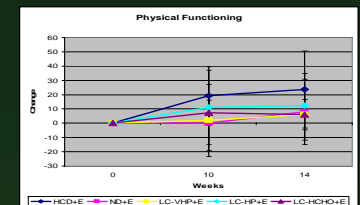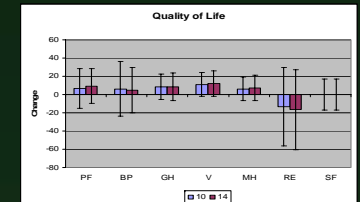
EFFECTS OF THE CURVES™ FITNESS AND WEIGHT LOSS PROGRAM VIII: BODY IMAGE

B Lanning, R Bowden, H Johnston, C Rasmussen, C Kerksick, T Magrans, B Campbell, J Baer, A Thomas, R Slonaker, E Pfau, M Grimstvedt, C Wilborn, B Marcello, D Fogt, L Taylor, C Mulligan, D Rohle, A Vacanti, S Ounpraseuth, P Casey, R Wilson, M Greenwood, C Earnest & R Kreider

Exercise & Sport Nutrition Lab, Baylor University, P.O. Box 97313, Waco, TX 76798-7313

Abstract

151 women participated in a 14-wk exercise and diet program. Subjects were assigned to an exercise and no diet group, an exercise and high calorie diet group, or one of three low calorie diets that involved consuming 1,200 kcal/d for 2 wks and 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal/d diets at 3/2, 3/2, 5/2, & 10/2 day intervals to maintain weight loss. Subjects participated in a supervised Curves fitness program 3 d/wk. Body composition, the Social Physique Anxiety (SPA) scale, a Rosenberg self-esteem scale (RSE), and a Cash Body Image Questionnaire were obtained at 0, 10, and 14 wks. Data were analyzed by repeated measures ANOVA and Pearson product correlation analysis. Data are presented as means ± SD changes from baseline for 10 and 14 wks, respectively. Results revealed that appearance evaluation ([AE] 28.2±34; 28.2±38 %), body area satisfaction ([BAS] 4.7±28; 5.5±34 %), and overweight preoccupation ([OP] 20.1±31; 17.8±34 %) significantly increased during the study while appearance orientation (AO), RSE, Self-Classified-Weight (SCW), and SPA scores were unchanged. Changes in fat weight positively correlated with SCW and negatively correlated with BAS while changes in percent body fat positively correlated with SPA and SCW while negatively correlating with AE and BAS. Results indicate that the Curves program improves some aspects of body image and that changes are correlated with body composition alterations.

Supported by Curves International, Inc. (Waco, TX)

Introduction

Body image can be defined as "an individual's appraisal of and feelings about the body and its function" (Cornwell & Schmitt, 1990). It is a standard that influences the way people feel about themselves, the activities they engage in, and their perception about the future (O'Brien, 1980). While body image can affect people in daily life, it is not static—it changes as a result of age, behavioral experiences, physical appearance, societal norms and the reactions of other people (Pruzinsky & Cash, 1990; O'Brien, 1980). Social physique anxiety (SPA), closely associated with body image, has been identified as the anxiety individuals experience in response to others' evaluation of their physique (Hart, Leary, & Rejeski, 1989). Both body image perception and SPA have been shown to be associated with self-esteem in some populations.

With the rise of obesity in the United States, many individuals are facing issues related to body image and choosing to engage in weight loss programs in order to reduce body size. The Curves Program for Women is one such program designed to promote health and fitness through weight loss. Although the program has been based on sound scientific rationale, the effects on psychological constructs in women have not been studied. The purpose of the this study was to evaluate the effects of the Curves program on body image, social physique anxiety and self-esteem in women.

Experimental Design

Subjects

- 151 sedentary women participated in a 14-wk exercise and diet program
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subjects guidelines with Baylor University

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to:
  - An exercise and no diet group
  - An exercise and high calorie mixed diet (2,600 kcal/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40 % C, 30% P, 30% F; 4 wks at 55%C, 15% P, 30% F) group
  - A low calorie high carbohydrate group
  - A low calorie high protein group
  - A low calorie very high protein diet
- The diet involved consuming 1200 kcal/d for 2 wks and 1600 kcal/d for 8 wks. Subjects then ingested 2600 kcal/d and 1200 kcal/d at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and resting energy expenditure (REE)

Training Protocol

- Subjects participated in a supervised 30-min hydraulic resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week.

Brief Methods

Participants completed three questionnaires: the Cash Multidimensional Body-Self Relations Questionnaire (MBSRQ-AS), the Social Physique Anxiety Scale (SPAS) and the Rosenberg Self-Esteem Scale (RSES) week 0, 10 14 of the program.

Statistical Analysis

Data were analyzed by repeated measures ANOVA and Pearson product correlation analysis using the SPSS statistical program. Data are presented as means ± SD changes from baseline for 10 and 14 wks, respectively.

Body Image, Self Esteem, & Social Physique Anxiety

Results

- The MBSRQ-AS is divided into five subscales: appearance evaluation (AE), appearance orientation (AO), body area satisfaction (BAS), overweight preoccupation (OP), and self-classified weight (SCW).
- The following variables significantly improved:
  - AE (28.2±34; 28.2±38 %)
  - BAS (4.7±28; 5.5±34 %)
  - OP (20.1±31; 17.8±34 %)
- Changes in fat weight positively correlated with SCW
- Changes in fat negatively correlated with BAS
- Changes in percent body fat positively correlated with SPA and SCW
- Changes in percent body fat negatively correlating with AE and BAS
- AO, RSE, Self-Classified-Weight (SCW), and SPA scores were unchanged.

Conclusions

- The findings from this study indicate that the Curves health and fitness program has a positive effect on appearance evaluation (feelings of physical attractiveness), body area satisfaction (satisfaction with discrete aspects of one's appearance) and overweight preoccupation (weight vigilance, dieting) of women who participate in the program.
- Further studies should be conducted to examine the reasons for lack of significant changes in SPA and self-esteem.

Funding
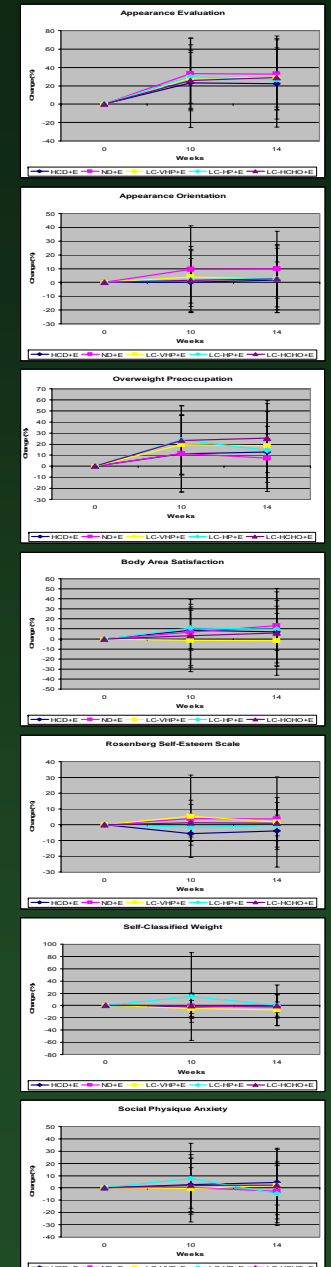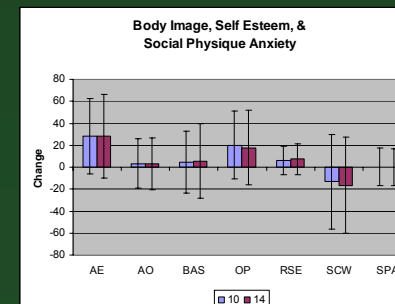
ANALYSIS OF THE SAFETY OF THE CURVES™ FITNESS AND WEIGHT LOSS PROGRAM HIGH PROTEIN DIETS

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Abstract

PURPOSE: Ketogenic diets are believed to promote weight loss by suppressing appetite, promoting lipolysis, sparing muscle mass, and maintaining energy expenditure. However, these diets have been criticized because some fear they may lead to excessive elevations in ketone bodies, increase kidney and liver stress, promote calcium and bone loss, and/or increase blood lipids. This study examined the effects of following the Curves moderate and high protein diets on ketone production, markers of renal and liver function, and blood lipids.
METHODS: 154 sedentary women (38.8±8 yr; 94.3±19 kg; 43.8±3.5 % body fat) participated in a 14-wk exercise and diet program. Subjects were assigned to an exercise and no diet group (E+ND); an exercise and high mixed calorie diet group (HCD); or, a low calorie high carbohydrate (HCHO), high protein (HP), or very high protein (VHP) diet. The diets involved consuming 1,200 kcal/d for 2-wks followed by ingesting 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal diet at 3/2, 3/2, 5/2, & 10/0 day intervals, respectively, in an attempt to maintain weight loss. Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD and HCHO diets and protein intake ranging from 50-63% (~2.0 – 2.4 g/kg/d) on the HP and VHP diets. Subjects participated in a supervised Curves 30-min resistance training circuit program that was interspersed with callisthenic exercises and performed 3-d per week. At 0, 2, 10, 10.4 and 14 weeks, subjects donated fasting blood samples, had DEXA whole body bone density determined, and completed a food satisfaction inventory. Data were analyzed by repeated measures ANOVA and Pearson Product correlations.
RESULTS: Serum ß-hydroxybutyrate levels significantly increased from baseline values ($p<0.002$) in the HP and VHP diets by 56±88% and 54±98%, respectively, after two weeks of dieting at 1,200 kcals/d but returned to near baseline levels thereafter with no differences observed among groups at week 10, 10.4 or 14. No significant interactions were observed among groups in creatinine, BUN, uric acid, total protein, AST, ALT, GGT, LDH, GGT, total cholesterol, HDL, LDL, calcium, alkaline phosphatase, or bone mineral content. Changes in ß-hydroxybutyrate at 2-weeks significantly correlated with changes in weight ($r=-0.24$, $p=0.002$), leptin ($r=-0.18$, $p=0.05$), glucose ($r=-0.17$, $p=0.03$), CK ($r=-0.15$, $p=0.05$), appetite ($r=-0.18$, $p=0.02$), and hunger ($r=-0.16$, $p=0.04$). **CONCLUSION:** The moderate and high protein Curves diets appear to be well tolerated and do not adversely affect health status.
(Sponsored by Curves International, Waco, TX)

Rationale

The Curves fitness and weight loss program has become a very popular means of promoting health and fitness among women. The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and fitness. Although the program has been based on sound rationale, the effects of following this program have not been studied. The purpose of this study is to examine the safety of the adhering to the Curves high protein diets in sedentary overweight females.

Experimental Design

Subjects

- 154 sedentary women (38.8±8 yr; 94.3±19 kg; 43.8±3.5 % body fat) participated in a 14-wk exercise and diet program.
- Subjects were informed as to the experimental procedures and signed informed consent statements in adherence with the human subject's guidelines of Baylor University.
- Testing sessions were performed at 0, 2, 10, 10.4 & 14 weeks to examine the effects of the Curves diet and exercise program.

Diet Protocol

- Based on baseline testing, subjects were randomly assigned to one of the following groups:
  - an exercise and no diet group (ND+E);
  - an exercise and high calorie mixed diet (2,600 kcals/d for 2 wks at 55% C, 15% P, 30% F; 8 wks at 40% C, 30% P, 30% F; 4 wks at 55% C, 15% P, 30% F) group (HCD+E);
  - a low calorie high carbohydrate group (LC-HCHO+E);
  - a low calorie high protein group (LC-HP+E); or,
  - a low calorie very high protein (LC-VHP+E) diet group.
- The diets involved consuming 1,200 kcal/d for 2-wks and 1,600 kcal/d for 8 wks. Subjects then ingested 2,600 kcal/d and 1,200 kcal diet at 3/2, 3/2, 5/2, & 10/0 day intervals in an attempt to maintain weight loss and REE.
- Diets were standardized with 30% dietary fat with carbohydrate intake ranging from 40-55% on the HCD+E and LC-HCHO+E diets and protein intake ranging from 50-63% on the LC-HP+E and LC-VHP+E diets.

Training

- Subjects participated in a supervised 30-min resistance training circuit program that was interspersed with calisthenic exercises and performed 3-d per week at the Baylor University Student Life Center.

Methods & Procedures

- Fasting blood samples were obtained at 0, 2, 10, 10.4 & 14 weeks.
- Serum ß-hydroxybutyrate levels were measured using a GM7 Micro-Stat Analyser (*Analox Insturments; London, UK*).
- Serum and whole blood samples were also analyzed by Quest Diagnostics for the all other variables examined in this study.

Statistical Analysis

- Data were analyzed by repeated measures ANOVA and Pearson Product correlation analysis using SAS for Windows version 8.2 software *(Cary, NC)* and are presented as means ± SD from baseline for each diet group.

Results

- The HP and VHP diets resulted in a significant increase in serum ß-hydroxybutyrate levels 56±88% and 54±98%, respectively, following two weeks of dieting.
- Despite the significant elevations, the serum ß-hydroxybutyrate levels returned to near baseline values and showed no significant difference among groups at weeks 10, 10.4, and/or 14.
- The levels of serum ß-hydroxybutyrate were not significantly interacted with the observed variables creatinine, BUN, uric acid, total protein, AST, ALT, GGT, LDH, GGT, total cholesterol, HDL, LDL, calcium, alkaline phosphatase, or bone mineral content among groups.

Conclusions

- The data from this study suggests that the moderate (HP) and high protein (VHP) used by Curves International, Inc. appears to be well tolerated and do not adversely affect health status of this subject population.

Funding

Beta-Hydroxybutyrate Levels

Change Beta-Hydroxybutyrate

Uric Acid

Change Uric Acid